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ASCLEPIAS EXALTATA (APOCYNACEAE) DISCOVERED IN SOUTHEASTERN MISSOURI

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Asclepias exaltata L. (poke milkweed or tall milkweed) is a native species found in bottomland and mesic upland forests and woodlands of northeastern/eastern North America. It ranges from Maine to northern Georgia, and west to Tennessee, Illinois, Iowa, and Minnesota. The plants are perennial and grow in relatively close groups, although they are often few in numbers. The common name "poke milkweed" is fitting for the species, as its general growth habit and leaf shape resemble pokeweed (*Phytolacca americana*). Synonyms for *A. exaltata* include *A. phytolaccoides* Pursh and *A. bicknellii* Vail (Gleason and Cronquist, 1991; U.S. Department of Agriculture, 2010).

Broyles and Wyatt (1993) mapped this species as being present in southeast Missouri, though no records of its occurrence had been made at the time (Yatskievych, 2006). On May 17, 2010, the author, along with Missouri State Park staff Ken McCarty, Denise Dowling, and Michael Cravens, observed a milkweed in bud stage in a drainage system in Trail of Tears State Park, Cape Girardeau County. Ken McCarty and the author discussed the plant in the field, and at the time neither could ascribe a specific identification to it. Upon subsequent review of Missouri's milkweed species in both the Flora of Missouri (Steyermark, 1963) and Steyermark's Flora of Missouri Volume II (Yatskievych, 2006), it was found that the plant did not key to any of the species listed. Fortunately Yatskievych (2006) noted *A. exaltata* at the end of the description of the genus *Asclepias* and described its habitat and characters that would distinguish it from Missouri's known species. A review of images on the USDA Plants website (U.S. Department of Agriculture, 2010) also aided in the confirmation that it was *A. exaltata*.

On May 18, 2010, the author, Denise Dowling and Michael Cravens revisited the location of the plants to photograph

(http://www.tropicos.org/Name/2601022) and voucher a specimen (*Crabtree et al.* s.n. [MO]). In all, 17 plants were growing in one grouping and another six plants were growing approximately 30 m up-slope. Further searching by Trail of Tears State Park Staff Steve Scheol resulted in the location of another individual plant in the general area. The population included both flowering and vegetative plants. The voucher specimen collected on May 19, 2010 is housed in the Missouri Botanical Garden Herbarium. Additional flowering plants were discovered in the park on June 6, 2011 in a valley approximately 2.8 km northwest of the initial discovery. A small number of desiccated flowering stems were found in the autumn of 2012, approximately 0.3 km south of the 2010 observation.

The main population of *A. exaltata* is located on a berm or low knoll at the base of an east-facing drainage system and is approximately 2.5 m from the margin of the gravel drainage bed (Lat. 37.448611° Long. -089.464167°). Associated vascular plants include *Acer saccharum, Fagus grandifolia, Liriodendron tulipifera, Quercus rubra, Asimina triloba, Lindera benzoin, Actaea pachypoda, Arisaema triphyllum, Asarum canadense, Eupatorium purpureum, Parthenocissus quinquefolia, Podophyllum peltatum,*

Figure 1. View of *Asclepias exaltata* stems from above showing the shapes of the opposite leaves.

and *Toxicodendron radicans*. On April 23, 2014, Trail of Tears State Park staff member Steve Scheol documented 30 plants in four distinct clusters at and in close proximity to this population.

The plants discovered on June 6, 2011 (Lat. 37.462975° Long. -089.48943°), were located on a south-facing slope under a more

Figure 2. Tip of a stem of *Asclepias exaltata* showing leaf shape and position, as well as a terminal inflorescence in bud. Note the twining stem and trifoliolate leaf of *Amphicarpaea bracteata* (hog peanut) climbing on the poke milkweed stem.

Figure 3. Close-up view of an inflorescence of *Asclepias exaltata* in bud.

open tree canopy, but the herbaceous plant associates were not noted at the time of discovery.

As noted by Yatskievych (2006), *A. exaltata* would key imperfectly to *A. amplexicaulis* Sm. or *A. incarnata* L.. The plant can be 1.5 m tall, have a glabrous stem or may have a light pubescence in narrow lines, have 5–8 pairs of large, opposite, broadly elliptic leaves with sharply pointed blade tips and bases tapering to the petioles (Fig. 1). The large flowers are white to dull pink or purple, on slender, drooping or spreading pedicels of a loose umbel (Figs. 2, 3) with usually several umbels present. *Asclepias exaltata* keys in Gleason and Cronquist (1991) with the following floral characters: having a horn present, floral hoods that are about equal to the gynostegium and the horns surpassing the hoods, lateral margins of the hood essentially parallel, hoods truncate and tubular, as opposed to scoop-shaped, and the hood terminating in a sharp, erect tooth. Plants typically flower from June through July, and may be found in full bud in mid to late May, as was the case of the Missouri population.

The presence of this plant in Illinois and concentrations along the Mississippi River in Iowa lead to speculation that the species may be present in other areas along the eastern border of Missouri, not solely in the southeast part of the state. Further searches of the woodland and forested valleys along much of the Mississippi River may lead to the discovery of additional populations.

LITERATURE CITED

Gleason, H. A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, ed. 2. New York Botanical Garden Press, Bronx.

Steyermark, J. A. 1963. Flora of Missouri. Iowa State University Press. Ames.

U.S. Department of Agriculture, Agricultural Research Service (USDA–ARS). USDA PLANTS database. [www.plants.usda.gov]. Accessed 22 December 2010.

Yatskievych, G. 2006. Steyermark's Flora of Missouri, Revised Edition, Volume 2. Missouri Botanical Garden Press. St. Louis.

BOTANICAL NOTES FROM THE BRANSON WILDERNESS

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Nestled in the amazing entertainment phenomenon that is the city of Branson Missouri, within sight of the Dixie Stampede and other theaters designed to entertain culturally-deprived tourists, is a remarkable piece of property. Known as the Lakeside Forest Wilderness Area, this parcel in Taney County protects 140 acres overlooking Lake Taneycomo that the city has been maintaining for its natural characteristics, as a nature retreat from the urban bustle.

Much of the land that is included in this park was previously owned by Dr. Edgar Lyle Owen. Born in 1906 in Oklahoma, Lyle and his family moved to the Branson area in 1921 (Owen, 1976, 1978), during his senior year in high school. In the early 1930s, he purchased a tract of land overlooking the White River for $14 an acre from Wilbur Winchester, who had built a three-room vacation cabin there from local stone in 1911. Dr. Owen went on to a career teaching economics at the University of Tulsa, but visited his Branson property in the summertime, traveling by train. During his visits, he accomplished ambitious feats of construction, including improving the house and barn, erecting an impressive array of nearly 2,000 linear feet of retaining walls, and hand-laying a series of 315 stone-and-mortar steps from the house down the steep bluff to a lower terrace near the lake for access to a small cave and a wet-weather waterfall. Dr. Owen retired from his professorship in the 1970s and he and his wife, Mary, moved back to his Branson property. He lived there until his death, sometime around the year 2000. In 1998, Dr. Owen sold about 130 acres, all but the 7.4 acres surrounding the homestead, to the city of Branson, citing his desire that it be protected as a "natural wilderness" and, after protracted negotiations, the city acquired the remaining acreage from his estate in 2009 (Fig. 1).

Figure 1. Map showing the approximate boundaries of the Lakeside Forest Wilderness Area in Branson, Missouri. Satellite image courtesy of Google Earth, taken on 4 April 2013.

The park is located on the east side of Fall Creek Road, just south of its intersection with State Highway 76 (Fig. 1). The approximate location of the Owen homesite is at the following coordinates: Lat. 36° 38' 05.44" N, Longitude 093° 14' 55.55" W. The house is near the high-point of the park at about 975 ft elevation, but the property extends eastward down a steep series of bluffy ledges to the shore of Lake Taneycomo at about 700 ft. The transition from the aquatic habitat of the reservoir to the dry upland is very abrupt along the shoreline, with little to no riparian zone. The northern portion of the park has slightly deeper soils and the walking path from the parking lot goes through a dry upland forest

dominated by *Quercus*, *Carya*, and *Fraxinus*, among other medium-sized trees. South of the house are scattered areas on the ridetop where the dolomite bedrock is exposed, and the vegetation is a matrix of woodland with glade openings, many of these encroached by *Juniperus*. Among the plants typical of the glades and bluff ledges is the uncommon American smoketree, *Cotinus obovatus*, and many of the native calcareous glade plants one would expect at such a site continue to persist. The Branson Department of Parks and Recreation, with assistance from the Missouri Department of Conservation, is beginning to manage the site more actively to restore the native plant communities.

Because Lyle Owen was living in Oklahoma most of the time, the primary resident of the house for several decades was his mother, Stella Owen. Stella had a love for nature and ornamental horticulture, and she developed an extensive series of ornamental gardens around the home. There she grew a diverse array of perennials, both exotics and native wildflowers, many in relatively massive plantings (Owen, 1976, 1978; Hartman, 1978). After Dr. Owen returned to the property full-time, he and his wife helped to keep up these gardens. However, before the city acquired the homesite it had lain fallow and untended for more a decade. During this time, a number of the non-native ornamentals began to diffuse into the surrounding landscape and became naturalized to varying degrees. Some of these, such as the bearded irises (*Iris germanica*) are relatively widespread in Missouri as local escapes from old homesteads. Others have not been recorded often outside of cultivation in the state and a small group of species have not previously been reported as escapes.

Starting in the late 1990s, a few botanists began visiting the site, including now-retired MDC botanist Tim Smith. The first collection of a naturalized exotic at the property was in 2004 by Michael Skinner, then a regional biologist with the Missouri Department of Conservation, who noted that *Jasminum nudiflorum* (see below) had become established outside of cultivation (Smith and Yatskievych, 2013). After the city acquired the property, some of its employees, notably Mona Menezes and Tara Norback, also began to take an interest in the plants growing at the site. The author had occasion to visit the site briefly in May 2014 and collected several voucher specimens. More recently, the park was

botanized by retired botanist Bill Summers and MDC biologist Rhonda Rimer.

The present report discusses some of the non-native angiosperm taxa that have become established at the site, including both state records and those rarely collected in the state. All voucher specimens are accessioned at the Missouri Botanical Garden herbarium. Data and specimen images are available by searching MBG's online institutional database at www.tropicos.org. Although attempts are underway to control some of the more widespread escapes, further botanical inventories may disclose the presence of yet more unusual taxa that have escaped from the Owen garden.

STATE RECORDS

Dictamnus albus L. (Rutaceae)—. This attractive species is unusual among the cultivated members of the Rutaceae in that it is a long-lived, herbaceous perennial, rather than a tree or shrub. *Dictamnus albus* is currently considered by most botanists to be the only species in the genus (although as many as five species and several infraspecific taxa sometimes have been recognized) and is native

Figure 2. Leaf of *Dictamnus albus*.

from Europe to China (Zhang and Hartley, 2008). It has long been cultivated, but was more commonly grown in gardens several decades ago than it has been in recent years.

The plants form clumps from a woody, spreading caudex. The stout, mostly unbranched stems are strongly ascending to nearly 1 m tall. The relatively few, large leaves are alternate and pinnately

Figure 3. Inflorescence of *Dictamnus albus.*

compound with 7–11(–13) leaflets that are serrate (Fig. 2). Fertile stems terminate in a relatively dense, elongate spikelike raceme (Fig. 3), with each short-pedicellate flower subtended by a bract. The flowers are zygomorphic, with an inconspicuous calyx of 5 lanceolate, basally fused sepals. Corollas consist of 4 ascending petals and 1 descending petal, these are relatively slender, up to 2.5 cm long in length, and variously white, pink, and/or purple. The 10 showy stamens are on descending, curved filaments and are attached to the rim of a well-developed nectar disk surrounding the ovary. The strongly lobed ovary ripens into a capsule-like ring of 5 basally fused follicles, each of which discharges up to 3 small seeds explosively. The common name gas plant derives from the pleasantly lemon-scented, dense glands covering the plants. The release volatile oils that can be ignited by a flame (several videos documenting this are available on www.youtube.com and elsewhere). In fact, when the stems die-back at the end of the growing season, the plants are highly flammable.

Gas plant has escaped sporadically from cultivation and is a relative newcomer to the North American Flora. It was first collected as an escape in Michigan in 1978 (Voss, 1985), in Vermont in 1981 (Zika, 1988), and was reported as potentially non-persistent in New York in 1990 (Weldy et al., 2015). Plants of *Dictamnus* are well established in the Owen garden, where they draw questions from curious visitors who do not recognize the species. They have also escaped sporadically into the surrounding woodlands. A voucher was collected on 7 May 2014 (*Yatskievych & Holmberg 14-18*).

Jasminum nudiflorum Lindl. (Oleaceae)—. Winter jasmine is a highly branched colonial shrub to 1.5 m tall with arching to spreading stems and branches. It is characterized by green to purplish-tinged, 4-angled twigs; relatively small, opposite leaves that are mostly ternately compound; solitary, perfect, axillary flowers with 5- or 6-lobed, yellow to reddish-tinged, trumpet-shaped corollas, and small, ellipsoid to ovoid berries that are olive green and turn black with age. As with other members of the Oleaceae, only 2 stamens are produced per flower. Plants bloom very early in the growing season. For a more detailed description, see Smith and Yatskievych (2013).

This species was first documented in 2004 by Michael Skinner (*Skinner 6201*), who noted that plants had invaded the degraded dolomite glade near the homesite. The cultivated population forms, large, dense patches in some of the raised beds bounded by retaining walls below the house, providing an abundant potential innoculum for further escapes. Smith and Yatskievych (2013) noted that southern Missouri is at the northern edge of the cold hardiness zone for this species; thus it is currently not widely cultivated in the state. This could change as average temperatures continue to increase, as they have in recent decades.

Kolkwitzia amabilis Graebn. (Caprifoliaceae)—. Beautybush is a dense shrub to 2.5 m tall with opposite, entire leaves. It resembles plants of the more widely cultivated genus *Weigela* Thunb. (weigela) in its profuse, pink flowers, but differs in the dense, stiffly spreading, persistent hairs on its pedicel and calyx, its somewhat smaller corollas (15–25 mm vs. 25–40 mm long), and achenes that are embedded in the spongy to woody bracts and crowned with the persistent calyces. This Chinese species has escaped from cultivation sporadically, mainly in the eastern half of the United States. At Lakeside Forest, it has naturalized abundantly in dry woodland and along the edges of dolomite glades, where it was first collected in 2014 (*Yatskievych & Holmberg 14-19*).

Lonicera fragrantissima Lindl. & Paxton (Caprifoliaceae)—. Variously known as winter honeysuckle, January jasmine, and sweet breath of Spring, this species is a densely branched shrub 2–3 m tall. Its stems and foliage are similar to those of other non-native bush honeysuckles in Missouri, but it differs from these in its earlier flowering time, frequently flowering as early as late January or February, usually before the leaves have developed. It also differs in its larger red fruits, which are oblong-obovoid and have two perianth scars apically, a result of the ovaries of the adjacent flowers in each pair becoming fused during maturation. The species is native to Asia and is widely cultivated in North America. It has escaped widely in the eastern states and sporadically as far west as portions of Texas and Utah, and the species is considered an invasive exotic pest in some southeastern states (www.invasiveplantatlas.org/subject.html?sub=3038). A fruiting voucher was collected in 2014 (*Yatskievych & Holmberg*

14-20) and a more recent collection of an unusual rapidly elongating extension shoot shows the potential of the taxon to produce whorls of three leaves at the nodes (*Rimer & Summers s.n.* on 22 June 2015).

Lysimachia clethroides Duby (Primulaceae)–. Gooseneck loosestrife is native to Asia, but is cultivated widely in the United States, both as an ornamental and as a bee plant. This taxon is strongly colonial from long-creeping, branched rhizomes and differs from other species of *Lysimachia* in Missouri in its alternate leaves, strongly arched, terminal, spikelike racemes, and white corollas. Bogler and Yatskievych (2013) discussed the species noting that until that time it had not yet been recorded as an escape in Missouri, but that it had become naturalized widely in the northeastern United States, including four states adjoining Missouri: Iowa, Illinois, Kentucky, and Tennessee. They also noted that the species is very aggressive in gardens and in some states it is considered an invasive exotic. A recently collected specimen documents that it is starting to escape from plantings in the Owen garden into the adjacent woodland and constitutes a first record for Missouri (*Rimer & Summers s.n.* on 22 June 2015).

SPECIES UNCOMMON IN MISSOURI

Ceratostigma plumbaginoides Bunge (Plumbaginaceae)—. Leadwort is a perennial herb (sometimes somewhat woody at the base) with spreading to loosely ascending stems and alternate, obovate to somewhat rhombic leaves that often become reddish tinged toward the end of the growing season. It produces dense clusters of showy flowers at the branch tips and from the axils of the upper leaves. The bracts and calyces are usually brownish red and contrast with the blue, trumpet-shaped corollas. The species was first reported as an escape in North America from Missouri by Dunn (1982), based on plants in an alley in Columbia (Boone County). The species was treated in Yatskievych (2013). Plants at Lakeside Forest escape sporadically into the woodlands surrounding the garden and were vouchered only recently (*Rimer & Summers s.n.* on 22 June 2015).

Exochorda racemosa (Lindl.) Rehder (Rosaceae)—. Common pearlbush is a densely branched shrub 1–3 m tall with elliptic to narrowly obovate leaves lacking stipules (an unusual character in the family). It flowers for a short time in the Spring, producing terminal racemes of showy, white-petaled flowers. Its fruits are more frequently encountered, and are 5-lobed capsules 6–10 mm long that tend to break up between the lobes at maturity. Each of the 5 locules usually contains a single seed, this with a prominent, complete or incomplete wing around the margin. This Asian taxon escapes sporadically in the eastern U.S. (Yatskievych, 2013) and was first collected in Missouri in 2006 at the Shaw Nature Reserve in Franklin county (*Holmberg 1747*). It was treated in Yatskievych (2013). A recent voucher specimen documents its escape in woodlands at Lakeside Forest (*Rimer & Summers s.n.* on 22 June 2015).

Vinca major L. (Apocynaceae)—. The greater periwinkle is similar in appearance to its more common congener, *V. minor* L. (common periwinkle), but differs in its larger, longer-petiolate, less glossy, somewhat thinner, ovate to triangular ovate leaves, as well as its larger flowers. It is a Eurasian native that is widely cultivated as an ornamental groundcover and has escaped widely, but sporadically, in temperate North America (Bogler, 2006). In Missouri, the species was known previously from a single site in St. Charles County, where it was first collected in 2005 by MDC biologist, Lia Bollman (now Lia Heppermann) (*Bollman s.n.*, on 11 January 2005, also on 12 May 2005). Because North American plants seldom, if ever, produce fruits, it has likely escaped from the garden at Lakeside Forest by stem fragments spread by people and/or wildlife. The voucher specimens from the park (*Yatskievych & Holmberg 14-18; Holmberg 5010*) are the Taney County records and the second report of this taxon outside of cultivation in Missouri.

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LITERATURE CITED

Bogler, D. J. 2006. Apocynaceae. Pp. 115–126 *in* G. Yatskievych. Steyermark's Flora of Missouri, Second Edition, Volume 2. Missouri Botanical Garden Press, St. Louis.

Bogler, D. J., and G. Yatskievych. 2013. Primulaceae. Pp. 773–793 *in* G. Yatskievych. Steyermark's Flora of Missouri, Second Edition, Volume 3. Missouri Botanical Garden Press, St. Louis.

Dunn, D. B. 1982. Problems in "keeping-up" with the flora of Missouri. Trans. Missouri Acad. Sci. 16: 95–98.

Hartman, V. 1987. The backward trail: An interview of Lyle Owen. White River Valley Historical Quarterly 9(7): 16–23.

Owen, L. 1976. Three Owen families of Taney County, Missouri. White River Valley Historical Quarterly 6(1): 1–7.

———. 1978. Memories of an Ozarks Mother—The 100 Years of Stella Owen. Mountaineer Press, Branson, MO.

Smith, T. E., and G. Yatskievych. 2013. Oleaceae. Pp. 492–509 *in* G. Yatskievych. Steyermark's Flora of Missouri, Second Edition, Volume 3. Missouri Botanical Garden Press, St. Louis.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots (Saururaceae–Cornaceae). Cranbrook Institute of Science, Ann Arbor, MI.

Weldy, T., D. Werier, and A. Nelson. 2015. New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), USF Water Institute. University of South Florida]. New York Flora Association, Albany, NY. [http://newyork.plantatlas.usf.edu] Website consulted on 4 August 2015.

Yang, Q., and S. Landrein. 2011. Linnaeaceae. Pp. 642–648 *in* Z.-Y. Wu, P. H. Raven, and D.-Y. Hong, eds. Flora of China. Volume 19. Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae. Science Press, Beijing.

Yatskievych, G. 2013. Steyermark's Flora of Missouri, Second Edition, Volume 3. Missouri Botanical Garden Press, St. Louis.

Zhang, D.-X., and T. G. Hartley. 2008. *Dictamnus* Linnaeus. Pp. 74–75 *in* Z.-Y. Wu, P. H. Raven, and D.-Y. Hong, eds. Flora of China. Volume 11. Oxalidaceae through Aceraceae. Science Press, Beijing.

Zika, P. F. 1988. Contributions to the flora of the Lake Champlain Valley, New York and Vermont, II. Bull. Torrey Bot. Club 115: 218–220.

A NEW SITE FOR RUNNING BUFFALO CLOVER (*TRIFOLIUM STOLONIFERUM*; FABACEAE) IN MISSOURI: IMPLICATIONS FOR ADDITIONAL SURVEY NEEDS AND SUGGESTED MANAGEMENT RECOMMENDATIONS

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Running buffalo clover (*Trifolium stoloniferum* Muhl. ex Eaton) was known historically from Arkansas, Illinois, Indiana, Kansas, Kentucky, Missouri, Ohio, and West Virginia, but few populations were documented anywhere in the United States between 1910 and 1983 (U.S. Fish and Wildlife Service, 1987, 1989). The discovery of two small populations in West Virginia in 1983 (Bartgis, 1983) and in Indiana in 1987 (Homoya et al., 1989; U.S. Fish and Service, 1987, 1989) led to its federal listing as an endangered species under the Endangered Species Act of 1973 (U.S. Fish and Wildlife Service, 1987). The rediscoveries in Indiana and West Virginia spurred additional survey efforts in the eastern United States, and by the time the initial Recovery Plan was completed in 1989 (U.S. Fish and Wildlife Service, 1989), 13 populations were known from four states: Indiana, Kentucky, Ohio, and West Virginia (U.S. Fish and Wildlife Service, 1989, 2008).

Trifolium stoloniferum is currently extant in Indiana, Kentucky, Missouri, Ohio and West Virginia (U.S. Fish and

[1] The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

Wildlife Service, 2007, 2008). As of 2014, the species is known from 110 sites scattered across the five-state region (Jennifer Finfera, U.S. Fish and Wildlife Service, Columbus, Ohio, pers. comm., Jan. 23, 2015). Due to the large number of populations discovered between 1985 and 2008 and protection and management actions undertaken, the U.S. Fish and Wildlife Service recommended that running buffalo clover be reclassified as a threatened species in 2008 (U.S. Fish and Wildlife Service, 2008). That recommendation, however, has yet to be formally proposed due to other priorities (Finfera, pers. comm. Jan. 23, 2015). Additionally, the initial Recovery Plan approved for the species in 1989 (U.S. Fish and Wildlife Service, 1989) was revised in 2007 (U.S. Fish and Wildlife Service, 2007).

In Missouri, the species was known historically from five sites collected between 1883 and 1901 (Tropicos: http://www.tropicos.org/Name/13034256?tab=specimens). Because searches for running buffalo clover failed to document any known native occurrences (Thurman, 1988), experimental plantings were undertaken on Missouri Department of Conservation and U.S. Forest Service land between 1990 and 1994 (Smith, 1998; Yatskievych, 2013). All but one of these introductions failed to persist and plantings were recommended to cease in 1998 (Smith, 1998; Theresa Davidson, U.S. Forest Service, pers. comm. Jan. 2015). *Trifolium stoloniferum* was considered extirpated from the state (Thurman 1988), other than planted introductions, until it reappeared, unexpectedly, in topsoil at two St. Louis locations in 1990 (Yatskievych, 2013). Attempts to document the species from the topsoil source were unsuccessful, but the clover was subsequently discovered at a natural site in Madison County in 1994 (Smith, 1998; Yatskievych, 2013). The discovery of plants in 1990 and 1994 led to an extensive search by Hickey (1994a) for other occurrences in the counties where the species had been recently documented. Hickey evaluated 107 of the 146 potential sites she identified and conducted field surveys at many, but no new occurrences were discovered (Hickey 1994a).

Additional searches for running buffalo clover were conducted in 1996 and 1997 (Smith 1998), but no additional populations were found until the species was discovered at two Gasconade River accesses in Phelps and Maries counties in 1998 and 1999 (Wakeman, 1999, 2001). Plants at these localities,

however, did not persist (U.S. Fish and Wildlife Service, 2007; Yatskievych, 2013). Subsequently, three subpopulations were discovered at Graham Cave State Park in Montgomery County in 2002, and two new populations were discovered at Cuivre River State Park in Lincoln County in 2005 and 2009 (U.S. Fish and Wildlife Service, 2007; Yatskievych, 2013). In 2011, one of the largest native populations was discovered along a private gravel road in Callaway County. At the time of discovery, about 250 flowering heads were estimated to exist, but this decreased to 50–100 flowering heads in 2012 and 5–10 in 2013. It is not known if the appearance at this locality was natural or due to a possible introduction via seeds contained in gravel placed on the road bed. Subsequent investigations determined that the original source of gravel was within five miles of the nearby Auxvasse Creek.

On 30 May 2014, the authors, along with the Callaway County site land owner, searched the private access road but found no evidence of plants. Interestingly, however, the land owner reported that he had observed an unusual clover on a friend's property located approximately eight miles from his residence. Upon receiving permission to access the second site, the authors met the land owner the same day and searched an access road within the riparian corridor of Crow's Fork Creek, a large tributary to Auxvasse Creek. The search resulted in the discovery of a new site for running buffalo clover that consisted of 50 rooted crowns and 26 flowering heads (Fig. 1). A voucher specimen (*McKenzie & Newbold 2545*) was collected and deposited at the Missouri Botanical Garden herbarium (MO).

The plants were located in the partial shade of a mature bottomland forest dominated by *Acer negundo*(box elder), *Gymnocladus dioicus* (Kentucky coffee tree), *Juglans nigra* (black walnut), and *Ulmus americana*(American elm). Associated plants in the ground layer of the stand included *Carex blanda* (eastern woodland sedge), *C. davisii* (Davis' sedge), *Chasmanthium latifolium* (Indian woodoats), *Elymus virginicus* (wild rye), *Festuca subverticillata* (nodding fescue), *Glechoma hederacea* (ground ivy), *Juncus tenuis* (poverty rush), *Leersia virginica* (whitegrass), *Muhlenbergia schreberi* (nimblewill), *Plantago major* (common plantain), *Poa annua* (annual bluegrass), *P. compressa* (Canada bluegrass), and *Stellaria media* (common chickweed).

On 11 May 2015, the authors returned to the site to monitor the population and counted 45 rooted crowns and 19 flowering heads. Plants at the site appeared healthy but were suffering competition from the adjacent stand of *Elymus virginicus*.

Habitat at the new site in Callaway County is similar to other known locations in Missouri and elsewhere; where disturbance occurs in a mesic habitat, where there is partial to filtered sunlight, and in an area that is underlain with limestone or other calcareous bedrock (U.S. Fish and Wildlife Service, 2007, 2008). The new locality is within the Ozarks Ecological Section of Missouri (Nigh and Schroeder, 2002) which has been identified as one of the regions in the eastern United States where this species is currently extant (U.S. Fish and Wildlife Service, 2007, 2008).

In addition to the Crow's Fork Creek, four other sites for the species were monitored in 2015. On 12 May, Newbold located four rooted crowns at the Van Dyke site (Callaway County). This was the first time the species had been documented at this locality since 2012 when it was likely impacted from a prolonged drought during the summer and fall of the same year. Newbold also searched the

Figure 1. *Trifolium stoloniferum,* running buffalo clover, just past flowering, at edge of road through riparian corridor of Crows Fork Creek, Callaway County, May 30, 2014. Photo by Paul McKenzie.

known locations of *T. stoloniferum* at Graham Cave State Park on 12 May and observed 17 rooted crowns and two flowering heads. This was the first time the species had been documented at this site since 2008. The authors searched the Madison County site on 26 May, but were unsuccessful in observing any plants. The last recorded observations at this site were in 2008 when the site was more open and less shaded than noted during this year's observations. On 21 May, the authors monitored the two known sites at Cuivre River State Park. At the one location along a disturbed foot trail, they counted 75 rooted crowns and 108 flowering heads, but noted that the site continues to be threatened by encroachment from multiflora rose (*Rosa multiflora*). The second locality is along an eroded bank of Sugar Creek that was undoubtedly created by flash-flood scouring, where 43 rooted crowns and 25 flowering heads were counted.

Numerous possible threats have been identified for the species, including permanent habitat loss due to urban sprawl; competition from non-native, invasive plant species; forest canopy closure; fragmented populations; elimination of grazing by native bison; excessive herbivory by insects; a reduction in pollinators; overgrazing by livestock; and the lack of minimal disturbance (Cusick, 1989; Hickey, 1994b; U.S. Fish and Wildlife Service, 2007, 2008). Other factors such as seed scarification, viruses, low genetic diversity, and potential dispersal by white-tailed deer have been identified as elements that may contribute to the persistence of populations, but divergent results in some studies suggest that additional research is warranted (Campbell et al., 1988; Sehgal and Payne, 1995; Hattenbach, 1996; Ford et al., 2003; U.S. Fish and Wildlife Service, 2007, 2008). In Missouri, the lack of seed-set may be a threat, but additional observations are needed. Although not identified in previous publications (e.g., U.S. Fish and Wildlife Service, 2007, 2008), climate change is likely to negatively impact populations of running buffalo clover across the species' range, especially due to more frequent or severe periods of drought or major flood events, as postulated by Hickey (1994b). We agree with Wilcove et al. (1998), who noted that there could be major potential impacts of climate change on imperiled species. The failure of the present authors to relocate any *T. stoloniferum* plants at the initial Callaway County site in May 2014 is undoubtedly related to the significant drought that occurred in the state in 2012.

There is a consensus among most authors that the need for natural or man-made disturbance through the implementation of various management actions is essential to the conservation of the species (Becus and Klein, 2003; U.S. Fish and Wildlife Service, 2007, 2008; Burkhart et al., 2013).

The sites of running buffalo clover discovered between 2002 and 2014 in Callaway and Montgomery counties are less than 20 miles apart and additional surveys in these counties are warranted. Provided landowner permission can be obtained, we recommend that disturbed areas be searched along stream banks, access roads, game trails, ATV trails, or other areas that are maintained by mowing, grazing, or timber management, especially within mesic woods or riparian corridors. Suggested areas include main stream reaches and tributaries of Auxvasse Creek, Bachelor Creek, Bynum Creek, Crows Fork Creek, Little Loutre Creek, Loutre River, Prairie Fork Creek, Richland Creek, and Whetstone Creek. Additionally, we recommend surveys be undertaken in similar areas adjacent to Cuivre River State Park, including main stream reaches and tributaries of Big Lead Creek, Bobs Creek, Cuivre River, Mill Creek, Sandy Creek, and Sugar Creek within a radius of approximately 10 miles from the park.

We concur with others (e.g., U.S. Fish and Wildlife Service, 2007) who have determined that populations of running buffalo clover benefit from minimal disturbance regimes. We suggest using an adaptive management approach to evaluate which management actions will facilitate persistence of the species. Management practices that have proven successful include light grazing, mowing, control of competing non-native plants, and soil disturbance (Hickey, 1994b; Cusick, 1989; Homoya et al., 1989; Mardarish and Schuler, 2002; U.S. Fish and Wildlife Service, 2007, 2008). Burkhart et al. (2013) analyzed the impact of different disturbance regimes on populations of *T. stoloniferum* at the Fernow Experimental Forest in Tucker County, West Virginia, and determined that the species responded best to disturbance that occurred at an interval of once every 8–14 years. Additionally, those authors concluded that even-aged management techniques such as clearcutting were preferred over single-tree selection and other forms of partial harvesting. Nelson (2005) and Watt (2011) both noted, however, that disturbance regimes today are much different than those that occurred during pre-settlement times and

it will be much more difficult to duplicate such processes on today's landscape. Nonetheless, we have no choice but to make recommendations within the context and conditions that exist on the current landscape and to do so in light of historical patterns and processes.

As noted by Cusick (1989) and Homoya et al. (1989), and outlined by the U.S. Fish and Wildlife Service (2007, 2008), lack of active management may cause the species to disappear or exhibit a decline in population size. Subpopulations of running buffalo clover at the Graham Cave State Park site in Montgomery County occurred along hiking trails and a picnic area maintained by mowing. All subpopulations at this locality were not located during surveys conducted 2011–2014, possibly because of the lack of management, drought, and/or excessive flooding that occurred during the period. At the initial Callaway County site, mowing was implemented post-flowering in 2011 but a decrease in flowering plants was noted in 2012 and 2013, and disappearance of the species in 2014 is more likely a result of the drought of 2012 than mowing practices. Nonetheless, observations by the authors in 2015 suggest that the species' has a resilient seed bank and can reappear at sites if there is an appropriate amount of disturbance and shading. The Madison County site is in need of disturbance and a reduction in over-shaded conditions.

As suggested by the U.S. Fish and Wildlife Service (2008), we recommend the development of management guidelines to assist private land owners and the Missouri Department of Natural Resources Division of State Parks. We endorse the development of disturbance techniques that may be most beneficial to the species depending on local environmental and edaphic conditions. Finally, we recommend that land owner incentive programs be developed to reward private land owners for undertaking management initiatives that enhance the habitat for this species.

LITERATURE CITED

Bartgis, R. L. 1983. Resdiscovery of *Trifolium stoloniferum* Muhl. ex A. Eaton. Rhodora 87:425–429.

Becus, M. S., and J. B. Klein. 2003. Mowing schedule improves reproduction and growth of endangered running buffalo clover (Ohio). Ecol. Restor. 20: 295.

Burkhart, J. Q., J. R. Rentch, and T. M. Schuler. 2013. Effects of forest management on running buffalo clover (*Trifolium stoloniferum* Muhl. ex A. Eaton) distribution and abundance in the Fernow Experimental Forest. Nat. Areas J. 33:156–162.

Campbell, J. J. N., M. Evans, M. E. Medley, and N. L. Taylor. 1988. Buffalo clovers in Kentucky (*Trifolium stoloniferum* and *T. reflexum*): historical records, pre-settlement environment, re-discovery, endangered status, cultivation and chromosome number. Rhodora 90: 399–418.

Cusick, A.W. 1989. *Trifolium stoloniferum* (Fabaceae) in Ohio: history, habitats, decline and rediscovery. Sida 13: 467–480.

Ford, W. M., D. Madarish, and T. M. Schuler. 2003. Influence of white-tailed deer digestion on running buffalo clover (*Trifolium stoloniferum*: Fabaceae Muhl ex. A. Eaton). Amer. Midl. Naturalist 149:425–428.

Hattenbach, M. J. 1996. Edaphic relations of an endangered plant, *Trifolium stoloniferum* Muhl. ex Eaton. M.S. Thesis, Ohio State University, Columbus.

Hickey, E. E. 1994a. A Missouri Survey for Running Buffalo Clover (*Trifolium Stoloniferum* Muhl. Ex Eaton Fabaceae) in Two Select Areas: the Lower Meramec River Basin-st. Louis County and Jefferson County, St. Francois Mountain Natural Section Surrounding an Indigenous Population: Madison County, and Parts of Iron, St. Francois, and Bollinger Counties. U.S. Forest Service Report, Rolla, MO.

———. 1994b. Establishment of experimental populations of running buffalo clover, *Trifolium stoloniferum,* on the Mark Twain National Forest in Missouri. U.S. Forest Service Report, Rolla, MO.

Homoya, M. A., J. R. Aldrich, and E. M. Jacquart. 1989. The rediscovery of the globally endangered clover, *Trifolium stoloniferum*, in Indiana. Rhodora 91: 207–212.

Mardarish, D., and T. M. Schuler. 2002. Effects of forest management practices on the federally endangered running buffalo clover (*Trifolium stoloniferum* Muhl. ex A. Eaton). Nat. Areas J. 22:120–128.

Nelson, P. W. 2005. The Terrestrial Natural Communities of Missouri, Revised Edition. Missouri Natural Areas Committee. Jefferson City.

Nigh, T. A., and W. A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City.

Sehgal, O. P., and L. Payne. 1995. Viruses affecting running buffalo clover, *Trifolium stoloniferum*. Pl. Dis. 79: 320.

Smith, T. E. 1988. The reintroduction of running buffalo clover (*Trifolium stoloniferum*) in Missouri, 1989–1998. Missouriensis 19: 12–22.

Thurman, C. M. 1988. Report on a search in Missouri for running buffalo clover (*Trifolium stoloniferum*). Missouri Department of Conservation Unpubl. Report, Jefferson City.

U.S. Fish and Wildlife Service. 1987. Endangered and threatened wildlife and plants. Determination of endangered status for *Trifolium stoloniferum* (running buffalo clover). Fed. Reg. 52(108): 21478–21480.

———. 1989. *Trifolium stoloniferum* Recovery Plan. U.S. Fish and Wildlife Service, Fort Snelling, MN.

———. 2007. Running buffalo clover (*Trifolium stoloniferum*) Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, MN.

———. 2008. Running buffalo clover (*Trifolium stoloniferum*) 5-year review: Summary and Evaluation. U.S. Fish and Wildlife Service Report. Reynoldsburg, OH.

Wakeman, A. 1999. A Survey for Running Buffalo Clover (*Trifolium stoloniferum* Muhlenb. ex Eaton) in the Gasconade River Basin of Missouri; first interim report for survey May & June, 1999. Rock Post Wildflowers, Report, Fulton, MO.

———. 2001. A Survey for Running Buffalo Clover (*Trifolium stoloniferum* Muhlenb. ex Eaton) in the Gasconade River Basin of Missouri; Second Interim Report for Survey, May & June 2000, July 2001. Rock Post Wildflowers, Report, Fulton.

Watt, L. A. 2011. Edaphic, Microtopographic, and Light Characteristics Associated with the Endangered Running Buffalo Clover (*Trifolium stoloniferum*) at the Bluegrass Army Depot, Madison County, Kentucky. M.S. Thesis. Eastern Kentucky University, Richmond.

Wilcove, D. S., D. Rothstein, J. Bubow, A. Philips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioSci. 48: 607–615.

Yaskievych, G. 2013. Steyermark's Flora of Missouri, Revised edition, Vol. 3. Missouri Botanical Garden Press, St. Louis.

VERBESINA OCCIDENTALIS — A PIONEER-ERA ADDITION TO THE MISSOURI FLORA?

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The genus *Verbesina* (Asteraceae; Heliantheae) comprises some 200–300 species, the variation in estimates in part because of the lack of a comprehensive, modern taxonomic treatment. The species may be annual or perennial herbs (rarely shrubs or trees), with the greatest diversity in the American tropics. Among the species, only sixteen occur in the United States (Strother, 2006) and only four of these have been found in Missouri in the past (Steyermark, 1963; Yatskievych, 2006). Within the Missouri flora, *Verbesina* is morphologically similar to *Helianthus*, differing mainly in its pappus of 2 relatively conspicuous awns that are persistent at fruiting (hence the name crownbeard) and fruits that are not only strongly flattened, but have the margins sharply angled or more commonly winged.

A fifth species of *Verbesina, V. occidentalis* (L.) Walter, was discovered by the author on October 21,2011, in an isolated portion of Miller County. On that day, *V. occidentalis* was at the end of its blooming period while nearby plants of *V. alternifolia* (L.) Britton ex Kearney was already producing ripened seed. A full length specimen, several feet in length, was later verified as *V. occidentalis* by Justin Thomas (Institute for Botanical Training) and George Yatskievych (Flora of Missouri Project).

This collection is believed to be the first definite documentation of the species in Missouri. It was reported earlier by Gleason and Cronquist (1963, 1991), Gleason (1980), and Strother (2006) in lists of states in which the species grows, but without reference to any voucher specimens. Yatskievych (2006) excluded it from the Missouri flora, noting that historical specimens collected by the Rev. John Davis in Marion, Pike, and Ralls counties were originally misdetermined as *V. occidentalis* but were subsequently redetermined as *V. alternifolia*. Yatskievych (2006) also noted that more recently collected specimens by Carl Darigo and Fr. James

Sullivan also resembled *V. occidentalis* in their mostly opposite leaves, but proved to be *V. alternifolia*, based on their floral and fruiting morphology.

Individuals of *V. occidentalis* resemble some plants of *V. alternifolia*. Both are tall, erect perennials that are colonial by rhizomes and have more-or-less winged stems. In the latter species, leaves are usually all or mostly alternate (vs. opposite in *V. occidentalis*), but occasional populations have most of the leaves opposite. Heads of *V. alternifolia* have (3–)8–25+ ray florets, as opposed to 1–3(–5) in *V. occidentalis*. The fruits of *V. alternifolia* tend to be broadly winged and have the pappus only 1–2 mm long (the awns tend to be curved), vs. narrowly winged and with the pappus 3–4 mm (and relatively straight) in *V. occidentalis*.

Verbesina occidentalis is relatively widely distributed in the eastern United States west to Illinois and Louisiana, as well as portions of Oklahoma and Texas. The populations closest to those in Missouri are in western Kentucky and Tennessee. How did the species become part of Missouri flora? It may represent a disjunct native population, part of a recurring pattern of fragmented distributions caused by relatively rapid climatic shifts from the end of the last Ice Age, as species attempted to migrate northward from refugia farther south.

Alternatively, the species may have arrived in Missouri more recently as a result of human *migration. Verbesina virginica* is most abundant from Alabama to Virginia, especially east of the Appalachian Mountains. Moving westward, county occurrences become more fragmented (USDA, 2015). This pattern is reminiscent of the dispersion associated with nineteenth century westward expansion by American pioneers of European descent. Miller County, Missouri ,was formed in 1837 and Tuscumbia, on the Osage River, became the county seat. Tuscumbia served as an active site of river commerce from that time, well into the earliest part of the next century. Building Bagnell Dam upstream in 1931 brought an end to the Osage River being used as an artery of commerce. The Miller County population of *V. occidentalis* is associated with an early primary road leading from Tuscumbia. This artery was replaced by a superior roadway at least 80 years ago. It is possible that *V. occidentalis* seed was attached to river cargo off-loaded at Tuscumbia and later scattered by accident while in transit across a land route. If this theory of origin is

correct, the Miller County population is quite old and approaching or surpassing a century of existence. In either case, the stand remains quite robust.

LITERATURE CITED

Cronquist, A. 1980. Vascular Flora of the Southeastern United States. Volume 1. Asteraceae. University of North Carolina Press, Chapel Hill.

Gleason, H. A., and A. Cronquist. 1963. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, ed. 1. PWS Publishers, Boston

Steyermark, J. A. 1963. Flora of Missouri. Iowa State University Press. Ames.

Strother, J. L. 2006. *Verbesina* Linnaeus. Pp. 106–111 *in* Flora of North America Editorial Committee. Flora of North America, North of Mexico. Volumes 21. Magnoliophyta:Asteridae (in part): Asteraceae, Part 3. Oxford University Press, New York.

U.S. Department of Agriculture, Agricultural Research Service (USDA–ARS). USDA PLANTS database. [www.plants.usda.gov]. Accessed 20 august 2015.

Yatskievych, G. 206. Steyermark's Flora of Missouri, Revised Edition, Vol. 2. Missouri Botanical Garden Press, St. Louis.

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Gleason, H.A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, ed. 2. New York Botanical Garden, Bronx, NY.

Palmer, E.J., and J.A. Steyermark. 1935. An annotated catalogue of the flowering plants of Missouri. Ann. Missouri Bot. Gard. 22: 375–758, 21 pl.

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